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Aerial Mobile Gateway for Wireless Sensor Networks utilizing drones

RoEduNet - September 2014

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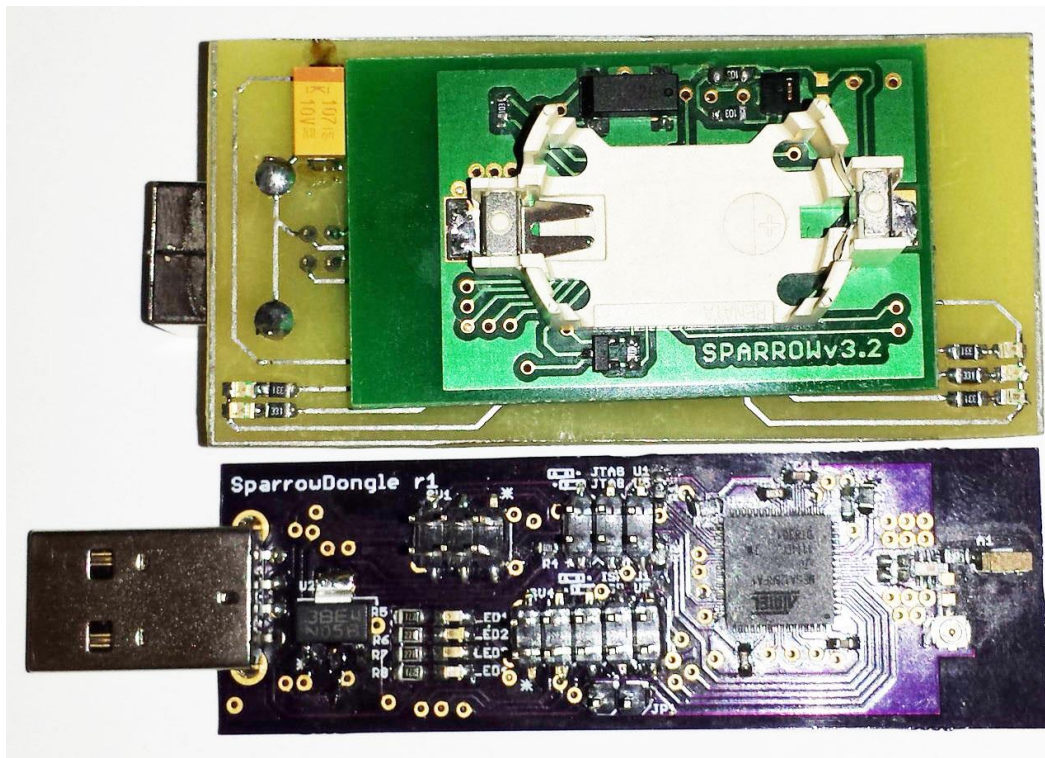


- Wireless Sensor Networks
 - small devices
 - wireless communication
 - gather data from environment
 - long battery life



Sparrow Family

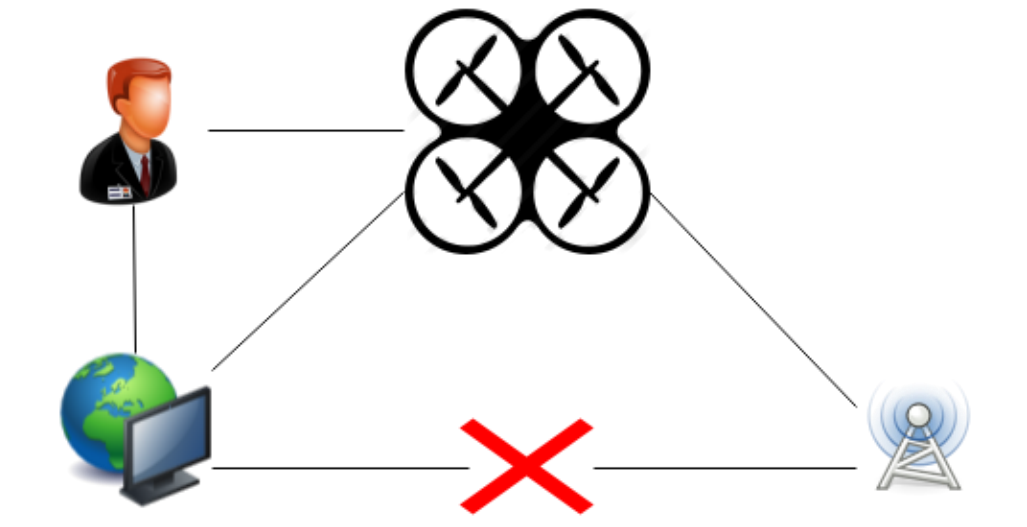
- Atmel ATMega32U4 for usb communication
- Atmel ATMega128RFA1 with 2.4 GHz transceiver





Why?

- Location of the network
- Rapid deployment
- Dynamic environment



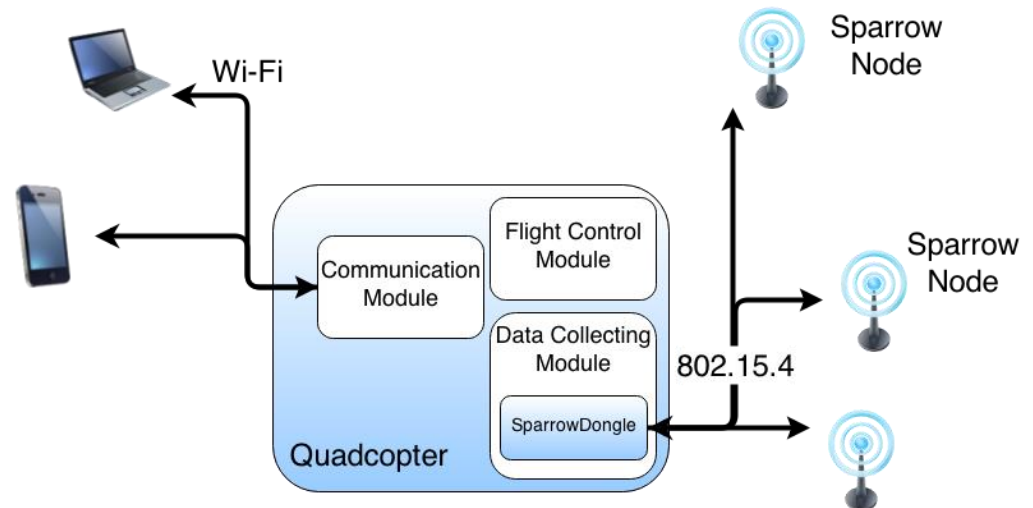


- Ease of interaction
- Proximity function
- Energy Saving
- Latest Data always saved
- Fault Tolerance



System Architecture

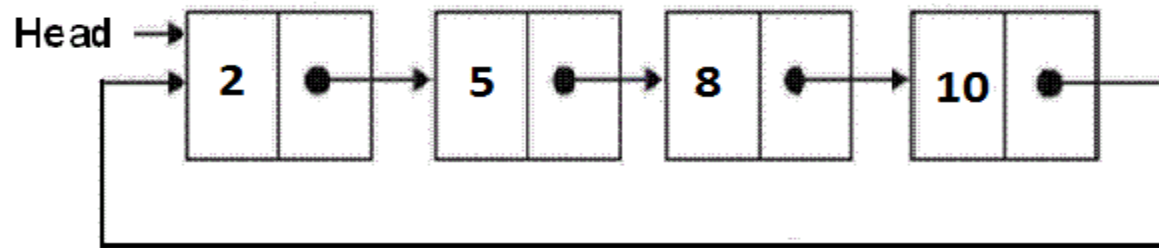
- Sparrow Module
- Data Collecting Module
- Communication Module
- Android Application





Sparrow Module

- Handles node communication
- Saves data in a circular list
- Replaces the oldest data with new data





Data Collecting Module

- Detects the presence of a gateway
- Saves the data received from the gateway into files
- Parses the data to obtain node information



Communication Module

- Creates JSON object with the nodes information
- Sends the object through port 8888
- Listens for new connection if current one is lost



Android Application

Modified FreeFlight 2.0

68%

20:32

FreeFlight 2.0 v2.0-SDK

PILOTING

AR.DRONE
ACADEMY

PHOTOS
VIDEOS

AR.DRONE
UPDATE

DOWNLOAD NODES
DATA

DEMO



Node Informations

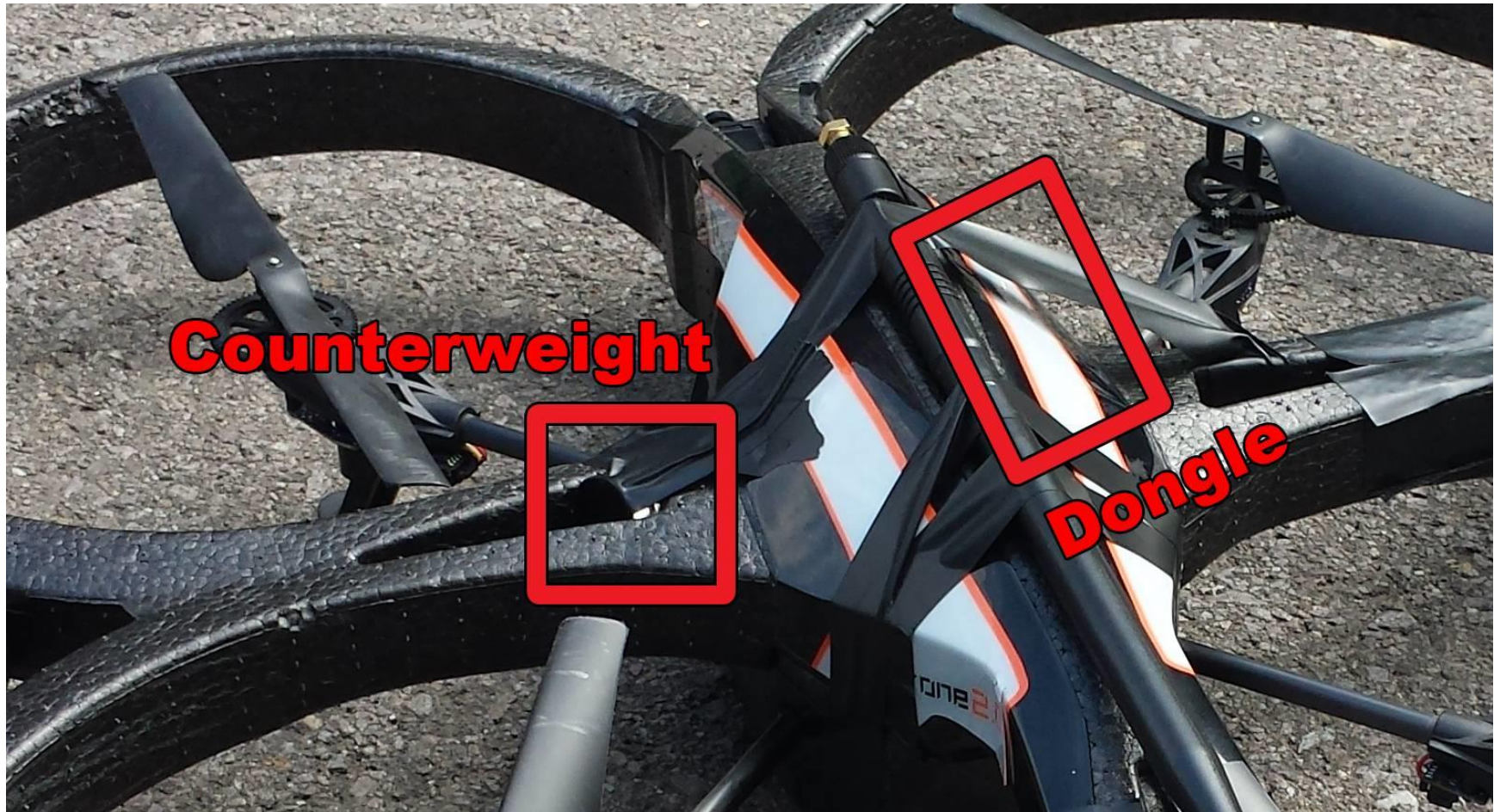
The screenshot displays a drone's ground station interface. At the top, a status bar includes icons for back, battery (64%), settings, Wi-Fi, an "EMERGENCY" button, a refresh icon, a "REC" button, and a camera icon. Below the status bar, the text "dongle online and 5 nodes connected" is visible. A list of five nodes is shown on the left:

- 1. id 106 0.26 sec -30dB
- 2. id 107 0.88 sec -54dB
- 3. id 2 13.12 sec -84dB
- 4. id 9 14.67 sec -87dB
- 5. id 0 7.25 sec -93dB

The main area of the interface shows a live video feed of a grassy field. Two red arrows point to specific nodes in the field: one labeled "Node 106" pointing to a small black pole, and another labeled "Node 107" pointing to a small blue object. On the right side of the video feed, there is a circular control panel with four directional arrows. At the bottom of the interface, a green button with the text "TAKE OFF" is visible.



Drone Modifications

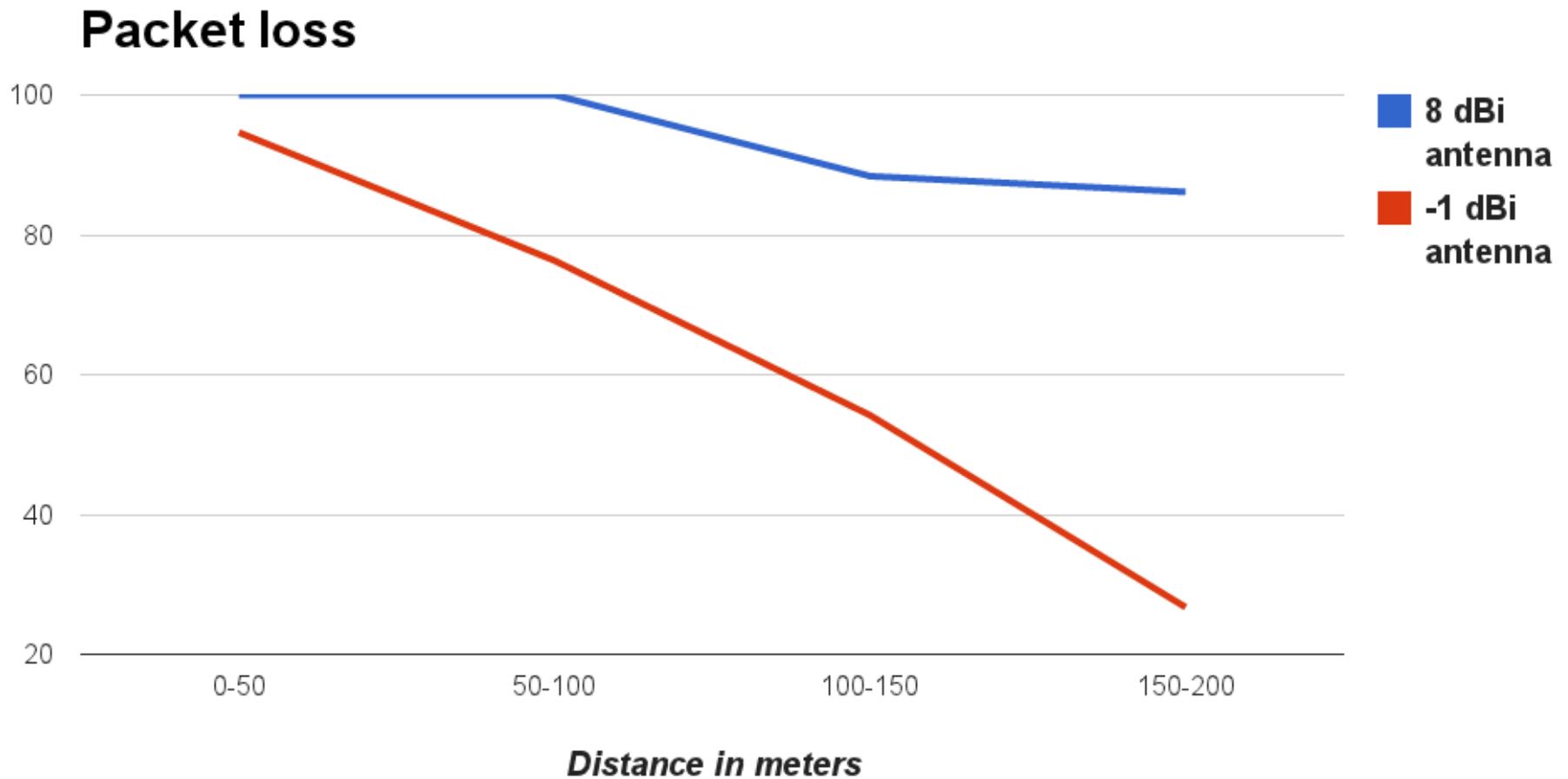




- All data saved successfully
- Communication distance - 300 meters with external 8dBi antenna
- Stability – affected by the modifications
- Packet Loss
 - small for an external 8dBi antenna
 - high for a small -1 dBi smd antenna



Packet loss





Conclusions

- System is functional
- Good transmission distance – up to 300 meters
- Simple to use



Questions

